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The Effect of Physical Training on Futsal Player Performance: A Case Study of High Schools in Gowa Regency

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Abstract
This study aims to analyze the effect of physical training on the performance of futsal players in Senior High Schools in Gowa Regency, South Sulawesi. Futsal as a sport that requires a combination of strength, speed, agility, and endurance requires a structured physical training program to achieve optimal performance. The research method used was an experiment with a pre-test and post-test control group design. The research sample consisted of 30 high school students in Gowa Regency who were divided into experimental and control groups, each consisting of 15 people. The experimental group was given a structured physical training program for 8 weeks with a frequency of 3 times per week, while the control group did conventional futsal training.The parameters measured included VO2max, 30-meter sprint speed, agility, leg muscle strength, and futsal technical skills. The results showed that the experimental group experienced a significant increase in all parameters measured compared to the control group. VO2max increased by 12.8%, sprint speed increased by 8.5%, agility increased by 11.2%, leg muscle strength increased by 15.3%, and technical skills increased by 13.7%. Statistical analysis using the t-test showed a significant difference ($p < 0.05$) between the two groups. The conclusion of this study is that structured physical training has a significant positive effect on the performance of high school futsal players in Gowa Regency, both in terms of physical and technical aspects.

Keywords: physical training, player performance, futsal, high school, Gowa Regency

INTRODUCTION

Futsal is one of the sports that is growing rapidly in Indonesia, especially among high school students. The characteristics of futsal games that are fast, dynamic, and require high intensity require players to have prime physical condition. According to Barbero-Alvarez et al. (2008), futsal is an intermittent sport that requires a complex combination of aerobic and anaerobic abilities, as well as high technical skills in a limited space.

The importance of physical training in improving the performance of futsal athletes has been recognized by various sports experts. Castagna and Alvarez (2010) stated that futsal players need a balanced combination of strength, speed, agility, coordination, and endurance to be able to play optimally. Furthermore, Milanoviÿ et al. (2015) explained that structured and systematic physical training can improve the functional capacity of futsal players, including increasing maximum oxygen consumption (VO2max), muscle strength, and anaerobic ability.

Research conducted by Dogramaci et al. (2011) shows that professional futsal players have a different physiological profile than field soccer players, where futsal players require higher anaerobic abilities due to higher game intensity in shorter duration. This is reinforced by the opinion of Naser et al. (2017) which states that high intensity interval training (HIIT) is very effective in increasing the aerobic and anaerobic capacity of futsal players.

From a biomotor perspective, Alvarez et al. (2009) stated that the main physical components that must be developed in futsal players include reaction speed, agility, explosive strength, and specific endurance. These

components are interrelated and affect the overall quality of the game. Meanwhile, Moore et al. (2014) emphasized that physical training programs for futsal players must be adjusted to the characteristics of the game involving multidirectional movements with high intensity.

Previous research conducted by Karahan (2012) on university-level futsal players showed that a 6-week physical training program can increase leg muscle strength by 13% and agility by 9%. Similar results were also shown in the study by Ribeiro et al. (2016) who found that plyometric training combined with technical training can improve sprint performance and jumping ability of young futsal players.

In Indonesia, especially in Gowa Regency, South Sulawesi, futsal training programs at the high school level are often still conventional and have not integrated systematic physical training principles. Gowa Regency, which has great potential in developing futsal sports, requires research that can provide scientific guidance to improve the quality of training in schools. The geographical conditions and tropical climate in Gowa Regency are also factors that need to be considered in designing an effective training program. In fact, adolescence is a golden age period for the development of physical and technical abilities. According to Lloyd and Oliver (2012), proper physical training during adolescence can provide a strong foundation for the development of athletes in the future.

Based on this background, this study aims to analyze the effect of structured physical training programs on the performance of futsal players in Senior High Schools in Gowa Regency. This study is expected to contribute to the development of more effective futsal training programs at the school level in Gowa Regency, as well as provide a scientific basis for improving student futsal achievements in South Sulawesi in particular and Indonesia in general.

METHODS

This study used an experimental method with a pre-test and post-test control group design. This approach was chosen to be able to objectively measure the effect of physical training programs on futsal players' performance by comparing the results between the treatment group and the control group.

The population of the study was all male students of SMA Negeri 1 Gowa who participated in futsal extracurricular activities, totaling 65 people. The selection of SMA Negeri 1 Gowa as the research location was based on the availability of adequate sports facilities and a futsal extracurricular program that had been running routinely. The sampling technique used purposive sampling with inclusion criteria, namely male students aged

16-18 years, who had participated in futsal extracurricular activities for at least 6 months, had no history of serious injury in the last 3 months, and were willing to participate in the research program for 8 weeks. Based on these criteria, 30 students were obtained who were then randomly divided into two groups, namely the experimental group and the control group, each consisting of 15 people.

The experimental group received treatment in the form of a structured physical training program consisting of strength, speed, agility, and endurance training. The training program was carried out 3 times per week for 8 weeks with a duration of 90 minutes per session. The training components included a 15-minute dynamic warm-up, strength training using body weight and resistance bands. for 20 minutes, speed and agility training for 20 minutes, aerobic and anaerobic endurance training for 20 minutes, futsal technical training for 10 minutes, and cooling down for 5 minutes.

The control group performed conventional futsal training commonly performed in schools in Gowa Regency, namely basic technical training, small games, and scrimmages with intensity and structure that were not specifically programmed. The frequency of training was the same as the experimental group, which was 3 times per week for 8 weeks.

The parameters measured in this study include physical and technical aspects. Physical aspects consist of VO2max measured using a multistage fitness test, 30-meter sprint speed using a sprint test,

agility using the Illinois agility test, and leg muscle strength using a leg dynamometer. Technical aspects are measured using a futsal skills test that includes dribbling, passing, and shooting accuracy.

Measurements were conducted twice, namely a pre-test before the training program began and a post-test after the training program was completed. All measurements were conducted by the same team to maintain data consistency and reliability. The data obtained were then analyzed using descriptive statistics to describe the characteristics of the sample and t-test to test the mean differences between the experimental and control groups and the differences between the pre-test and post-test in each group.

RESULT AND DISCUSSION

Data analysis shows that structured physical training program has a significant effect on improving the performance of futsal players at the high school level. The pre-test results showed that both groups had initial conditions that were not significantly different, with a p value>0.05 for all parameters measured. This indicates that both groups have a homogeneous baseline so that the comparison of post-test results can be done validly.

In the VO2max parameter, the experimental group experienced an average increase from 42.3 ml/kg/min to 47.7 ml/ kg/min or an increase of 12.8%. While the control group only experienced an increase from 42.1 ml/kg/min to 43.2 ml/kg/min or 2.6%. Statistical tests showed a significant difference between the two groups (p=0.001). The significant increase in VO2max in the experimental group indicated that the structured physical training program successfully increased the aerobic capacity of the players. This is in accordance with the research of Milanoviÿ et al. (2015) which stated that programmed interval training and endurance training can increase the efficiency of the cardiorespiratory system.

The results of the 30-meter sprint speed measurement showed that the experimental group experienced an improvement in time from 4.82 seconds to 4.41 seconds or an increase of 8.5%.

The control group experienced minimal improvement from 4.85 seconds to 4.78 seconds or only 1.4%.

This difference is statistically significant with a p value of 0.003. This increase in sprint speed indicates that systematic speed and explosive strength training can improve alactic anaerobic ability which is important in futsal.

Agility parameters measured using the Illinois agility test showed encouraging results. The experimental group experienced an improvement in time from 16.8 seconds to 14.9 seconds or an increase of 11.2%. The control group experienced minimal improvement from 16.9 seconds to 16.4 seconds or only 3.0%. Statistical analysis showed a very significant difference with a p value = 0.000. This significant increase in agility is very important in futsal because this game requires the ability to change direction quickly and efficiently in a limited space.

Leg muscle strength experienced the greatest increase among all physical parameters. The experimental group experienced an increase from an average of 68.2 kg to 78.6 kg or an increase of 15.3%. The control group only experienced an increase from 67.8 kg to 69.5 kg or an increase of 2.5%. This difference was very significant with a p value of 0.000. Increase in strength 3 This significant leg muscle mass indicates the effectiveness of the strength training program being performed. Good leg muscle strength is essential in futsal for jumping, kicking and acceleration abilities.

The technical aspects measured through the futsal skills test also showed significant improvement. The experimental group experienced an increase in score from 72.5 to 82.4 or an increase of 13.7%. The control group experienced an increase from 71.8 to 74.2 or 3.3%.

This difference is significant with a p value of 0.002. This increase in technical skills indicates that good physical condition can support more efficient and effective technique implementation.

The results of this study are in line with the theory put forward by Bompa and Buzzichelli (2019) that systematic physical training can improve physiological adaptations that support sports performance. Increased VO2max indicates that the player's cardiorespiratory system becomes more efficient in delivering and using oxygen, which is important for endurance in intensive futsal games. Increased speed and agility indicate that the player's neuromuscular system becomes more responsive and efficient in producing fast and precise movements.

Significant increases in leg muscle strength indicate that the training program has successfully improved the muscle's ability to produce greater force. This not only impacts physical ability but also technical aspects, as better strength allows players to perform techniques with greater precision and power. This interconnection between physical and technical abilities explains why improvements in physical condition are also followed by improvements in technical skills.

This finding also supports the concept proposed by Lloyd and Oliver (2012) about the importance of physical training in adolescence. The good adaptation response in the experimental group shows that high school players have great potential to develop physical abilities through a structured training program. This has important implications for the development of futsal talent at the school level.

The significant difference in results between the experimental and control groups indicates that conventional futsal training that only focuses on technical and tactical aspects is not enough to optimize player performance. Integration of systematic physical training with technical training has been shown to provide better results. This confirms the importance of a holistic approach in futsal training programs that include the development of all aspects necessary for optimal performance.

From a practical perspective, the results of this study provide evidence-based for the development of futsal training programs in schools in Gowa Regency in particular and South Sulawesi in general. The physical training program implemented in this study can be used as a model to improve the quality of extracurricular futsal training in high schools in the region. Consistent improvements in all parameters indicate that this program is comprehensive and effective for the high school student population. However, this study also has several limitations that need to be considered.

The 8-week study duration may not be sufficient to see long-term adaptation. In addition, external factors such as nutrition, rest, and physical activity outside the exercise program were not strictly controlled. Further research is recommended to use a longer duration and control more confounding variables to obtain more comprehensive results.

The implication of this study is the need for reorientation of futsal training programs in schools in Gowa Regency from an approach that only focuses on technical-tactical to a more holistic approach by integrating systematic physical training. Sports teachers and futsal coaches in schools in Gowa Regency need to improve their understanding of the principles of physical training and how to integrate them into futsal training programs. In addition, there needs to be support from the Gowa Regency Education Office and schools in providing facilities and equipment that support effective physical training programs.

CONCLUSION

The findings of this study confirm that a holistic approach to futsal training that integrates physical and technical components provides more optimal results compared to conventional approaches that only focus on technical and tactical aspects. This shows the importance of a comprehensive understanding of the physical needs of futsal players in order to design an effective training program. This study also proves that adolescence is the right period for the development of physical abilities through structured training.The good adaptation response of high school students in Gowa Regency shows great potential for developing futsal talent in the region through a scientifically based training program. For sports practitioners in Gowa Regency, the results of this study provide clear guidance on the components of physical training that need to be developed to improve the performance of futsal players. The training program that has been proven effective in this study can be adapted and implemented in other schools by considering the conditions of the facilities and resources available. For further research, it is recommended to conduct a study with a longer duration to see the long-term effects of the physical training program. In addition, research with a larger sample and involving several schools in Gowa Regency will provide better generalization. Research on the influence of environmental factors such as tropical climate on the effectiveness of the training program is also interesting to study further.

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